Response to the Review of the Technical Approach for Calculating Recreational Soil Screening Levels for Chemicals, Revision 2, Los Alamos National Laboratory, EPA ID No. NM0890010515, HWB-LANL-12-042, Dated August 31, 2012

INTRODUCTION

To facilitate review of this response, the New Mexico Environment Department's (NMED's) comments are included verbatim. Los Alamos National Laboratory's (LANL's or the Laboratory's) responses follow each NMED comment.

COMMENTS

NMED Comment

1. *There were some updates noted in input parameters for the derivation of the recreational screening levels. Some of the assumptions were not consistent with the NMED soil screening level document. However, the differences appear to be more conservative and are therefore acceptable.*

LANL Response

1. Comment noted. No response necessary.

NMED Comment

2. *The recreational screening levels are an expansion of the backyard user scenario and include children potentially exposed to soil while playing outside in the areas of canyons accessible for extended periods of time. A major concern with this scenario is that it was derived based on children at least six years of age (6-12 year old children); it excludes potential exposures to children younger than six. While it is noted that this age group has been applied in past versions of the recreational screening levels, it appears that the screening levels need to be updated so that they are protective of younger children. As noted in the derivation of mutagenic chemicals, early childhood exposures were also eliminated.*

   In reviewing the derivation of the lead screening level (Appendix B), it was clearly presented that the lead screening level based on children six to seven years of age is not protective of children under six. The calculated lead screening level for children four to seven years of age was 1,110 milligrams per kilogram (mg/kg) versus that for a six to seven year old child of 1,350 mg/kg. It is plausible that younger children accompany parents or older siblings on hikes and/or may play in accessible canyon areas.

   The recreational screening levels should be derived so that they are protective of all children potentially exposed to canyon soils; this includes children younger than 6 years of age. Revise the screening levels (to include the mutagenic calculations and lead) to encompass exposure to all children (two to 12 years old). While it is agreed that children younger than two are unlikely to be exposed to canyon soils through walking or playing, the supporting documentation should contain a discussion of exposure and potential risks to infants/toddlers younger than two years of age.

LANL Response

2. As discussed and agreed to in a conference call with NMED on October 1, 2012, the following revisions to the document have been incorporated.

    a. A discussion of exposure assumptions and parameters related to the extended backyard scenario has been added to the report to explain how children less than 6 yr of age are protected under the scenario. The added text has been incorporated in section 2.0, page 2, first and second full paragraphs. Based on the agreement, the scenario has not been modified to include exposure to all children (2 to 12 yr old).

    b. LANL agreed to use the lead screening level for children 4 to 7 yr of age (1110 mg/kg) as the recreational SSL. Appendix B (last paragraph) and Appendix D have been revised accordingly.

NMED Comment

3. In looking at the spreadsheet for the calculation of recreational soil screening levels for carcinogenic effects (with adjustment for mutagenicity), the following issues were identified:

a. It appears that the age-adjusted soil ingestion factor mutagens were based on Equation 7 for all three pathways (ingestion, dermal and inhalation). The age-adjusted soil ingestion factor mutagens should have been derived using Equation 13. Modify the spreadsheet accordingly.

b. The equation for derivation of the inhalation pathway appears to have been based on Equation 5 instead of Equation 11. Modify the spreadsheet accordingly.

c. Equations 6 and 8 appear to have been used to derive the dermal pathway data; Equations 12 and 14 should have been applied. Modify the spreadsheet accordingly.

LANL Response

3. The only difference between the carcinogen soil screening level (SSL) equations for mutagens and nonmutagens is the use of age-specific mutagenicity adjustment factors that are applied to the exposure duration age ranges in the mutagen calculations (see Equations 5, 7, and 8 compared with Equations 11, 13, and 14). The spreadsheet has simplified the SSL calculations for mutagenic carcinogens by using exposure duration values that have been weighted to include the mutagenicity adjustment factors. These weighted values are represented as ED_child_mut and ED_adult_mut, respectively, in the spreadsheet provided in Appendix C of the report (on CD). The calculation of ED_child_mut is as follows: ED_child (6 yr) × 3 = 18 yr, where 3 is the value of the mutagenicity adjustment factor for ages 6 to less than 12 yr. The calculation of ED_adult_mut is as follows: (ED_12–16 [4 yr] × 3) + (ED_16–<36 [20 yr] × 1) = 32 yr, where 3 is the value of the mutagenicity adjustment factor for ages 12 to 16 yr, and 1 is the mutagenicity adjustment factor for individuals 16 yr and older. The total exposure duration is 30 yr.

    The calculations are documented in notes included in cells holding the values of 18 yr and 32 yr in the worksheet “SSLs-Carc_Mut” (on CD). The result is a shortened equation in the spreadsheet for the mutagen calculations relative to the equations presented in the report. Therefore, the calculation of recreational SSLs for carcinogenic effects (with adjustment for mutagenicity) is correct, and no revisions to the spreadsheet are necessary. However, Table 1 (page 5) has been revised and text has been added to the report (page 12) to define the exposure duration mutagenic multiplier parameter (ED_mut) and to explain the calculation of the age-adjusted soil ingestion factor mutagens ($IFSM_{adj}$, Equation 13); age-adjusted skin contact factor mutagens ($DFSM_{adj}$, Equation 14); and concentration for inhalation (C [inhalation], Equation 11).